

DETAILED ACTION

Amendment

1. Acknowledgement is made of Amendment filed 02-05-10.
2. Claims 1, 4, 7, 11, 15, 18 and 21 are amended.
3. Claims 2, 3, 6, 12-14, 16, 17, 20 and 26-28 are canceled.

Response to Arguments

4. Since claims 14 and 28 are canceled, the Claim Objections of Claims 14 and 28 have been withdrawn.
5. Although Claims 4 and 18 are amended, they are still under Claim Objections. (see below, Claim Objections)
6. Applicant's arguments filed 02-05-10 have been fully considered but they are not persuasive.

Applicant argues that Tilton et al. also fails to disclose a pressure plate that contacts an underside of the printed circuit board and presses the printed board against the seal, as recited in the amended claims 1 and 15.

This argument is not persuasive because

Marian disclosed a housing (sealed housing 36, fig. 3A) sealed by a circuit board (34, fig. 3A) and Rockwood disclose a seal (O-ring 96, fig. 8) is disposed between the printed circuit board and the housing for the sealing; Tilton teaches a pressure plate (508, fig. 5) that contacts an underside of the printed circuit

board and tighten by the screws to pressure the printed circuit board from the under side (fig. 5);

Since there is the seal already on the top of the circuit board, between the circuit board and the housing (see above), when the pressure plate tighten by the screws to pressure the printed circuit board from the under side (see above), the printed circuit board would be against the seal, it would have been obvious to one having ordinary skill in the art.

Claim Objections

7. Claims 4 and 18 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Since the limitations of claims 4 and 18 are already cited in the new amended independent claims 1 and 15 respectively, therefore, claims 4 and 18 should be canceled or amended.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1, 4, 5, 7, 8, 15, 18, 19, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marian (US5913688) in view of Kaczmarek (US6542577), Rockwood (US6316768) and Tilton (US6108201).

Re Claim 1, Marian show and disclose

A housing having a liquid-tight electric bushing comprising:

an opening in the housing (opening of the sealed housing 36, fig. 3A);
a printed circuit board (34, fig. 3A) mounted to the housing and having at least first and second layers (73 and 70, fig. 5), the at least first and second layers being configured without a continuous opening (opening for 72 and 68, fig. 5) such that the printed circuit board is a liquid-tight closure (the housing adapted for sealing with the printed wiring board [claim 1]) for the liquid-tight housing, the first layer being produced from an electrical insulation material (dielectric layer, [col. 8, line 2]) and being top side of the printed circuit board that spans the

opening (fig. 3A) and the second layer being a conductor track (conductive trace 70, fig. 5) in the interior of the printed circuit board,

wherein a first contact element (72, fig. 5) is disposed on the top side and in a bore through the first layer (a hole through 73, fig. 5) that extends to at least the second layer (70, fig. 5).

Marian does not disclose

- 1) a housing for an X-ray tube, wherein a coolant oil is circulated through the housing at an overpressure to cool the X-ray tube during operation; the liquid-tight closure that prevents the cooling oil from flowing outside of the housing;
- 2) a seal is disposed between the printed circuit board and the housing;
- 3) a pressure plate contacts the underside of the printed circuit board and presses the printed circuit board against the seal.

Kaczmarek teaches a device wherein

a housing (36, fig. 1) for an X-ray tube (14), wherein a coolant oil (32) is circulated through the housing at an overpressure to cool the X-ray tube during operation (fig. 1); the liquid-tight closure that prevents the cooling oil from flowing outside of the housing (fig. 1);

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the circuit board to seal the housing with cooling oil of Kaczmarek as in the liquid-tight sealed housing of Marian, in order to provide a seal which resists leakage of cooling oil from the housing

(Kaczmarek, [Abstract]), and since Marian states in Claim 1, that the housing adapted for sealing with the printed wiring board.

Rockwood teaches a device wherein

2) a seal (O-ring 96, fig. 8) is disposed between the printed circuit board and the housing.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the O-ring as taught by Rockwood in the electronic device of Marian, in order to able to get a better sealing between the printed circuit board and the house of the chamber.

Tilton teaches a device wherein

3) a pressure plate (508, fig. 5) that contacts an underside of the printed circuit board and tighten by the screws to pressure the printed circuit board from the under side (fig. 5); (Notes: since there is the seal already on the top of the circuit board, between the circuit board and the housing (see above), when the pressure plate tighten by the screws to pressure the printed circuit board from the under side, the printed circuit board would be against the seal).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the pressure plate as taught by Tilton in the electronic device of Marian, in order to be able to reinforce the seal and protect the printed circuit board in the electronic device.

Re Claim 15, Marian show and disclose

A method of using a printed circuit board to close an opening provided in a housing and as an electric bushing comprising:

mounting the printed circuit board (34, fig. 3A) comprising a first layer (73) on the housing (36), the printed circuit board having no continuous opening (opening for 72 and 68, fig. 5) such that the printed circuit board is a liquid-tight closure (the housing adapted for sealing with the printed wiring board [claim 1]) for the liquid-tight housing, wherein the first layer spans the opening (opening of the housing, fig. 3A) and is the top side of the printed circuit board (fig. 3A) and is produced from an electrical insulation material (dielectric layer, [col. 8, line 2]),

disposing a first contact element (72, fig. 5) on the top side and through a bore (a hole through 73, fig. 5) in the top side, wherein the bore extends to at least a second layer (70, fig. 5) formed in the printed circuit board as a conductor track (conductive trace, fig. 5);

Marian does not disclose

1) a housing for an X-ray tube, wherein a coolant oil is circulated through the housing at an overpressure to cool the X-ray tube during operation; the liquid-tight closure that prevents the cooling oil from flowing to the outside of the housing;

2) a seal is disposed between the printed circuit board and the housing;
3) a pressure plate contacts the underside of the printed circuit board and presses the printed circuit board against the seal.

Kaczmarek teaches a device wherein

1) a housing (36, fig. 1) for an X-ray tube (14), wherein a coolant oil (32) is circulated through the housing at an overpressure to cool the X-ray tube during operation (fig. 1); the liquid-tight closure that prevents the cooling oil from flowing to the outside of the housing (fig. 1);

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the circuit board to seal the housing with cooling oil of Kaczmarek as in the liquid-tight sealed housing of Marian, in order to provide a seal which resists leakage of cooling oil from the housing (Kaczmarek, [Abstract]), and since Marian states in Claim 1, that the housing adapted for sealing with the printed wiring board.

Rockwood teaches a device wherein

2) a seal (O-ring 96, fig. 8) is disposed between the printed circuit board and the housing.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the O-ring as taught by Rockwood in the electronic device of Marian, in order to able to get a better sealing between the printed circuit board and the house of the chamber.

Tilton teaches a device wherein

3) a pressure plate (508, fig. 5) that contacts an underside of the printed circuit board and tighten by the screws to pressure the printed circuit board from the under side (fig. 5); (Notes: since there is the seal already on the top of the circuit board, between the circuit board and the housing (see above), when the

pressure plate tighten by the screws to pressure the printed circuit board from the under side, the printed circuit board would be against the seal).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the pressure plate as taught by Tilton in the electronic device of Marian, in order to be able to reinforce the seal and protect the printed circuit board in the electronic device.

Re Claim 4 and 18, Marian show and disclose

According to claims 1 and 15 respectively, the pressure plate presses the printed circuit board against the seal (see claims 1 and 15) such that printed circuit board is the liquid-tight that prevent the coolant oil from flowing outside of the housing (see claims 1 and 15, see also Claim Objections).

Re Claims 5 and 19, Marian show and disclose

According to claims 1 and 15 respectively, wherein the first contact element is coupled to a second contact element (68, fig. 5) via the second layer.

Re Claims 7 and 21, Marian show and disclose

According to claims 5 and 19 respectively, wherein the second contact element is on an underside (bottom) that is opposite the top side (fig. 5).

Re Claims 8 and 22, Marian show and disclose

According to claims 5 and 19 respectively,
Marian does not disclose

the second contact element extends to an outside an edge of the printed circuit board.

Rockwood teaches a device wherein

the second contact element extends to an outside an edge of the printed circuit board (extension part of 102, extends to outside the side edge of the printed circuit board, fig. 8).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the contact element extends to outside of the edge of the printed circuit board as taught by Rockwood in the printed circuit board of Marian, in order to able to electrically couple from inside sealed chamber 92, 94 to outside (Rockwood, Para. [col. 13, line 37]), and also be able to electrically couple the electrical device 106 inside the sealed chamber to the outside of the electronic device (Rockwood, Para. [col. 13, line 46]).

11. Claims 9-11 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marian in view of Kaczmarek, Rockwood and Tilton as applied to claims 1, 5, 15 and 24 above, further in view of Powell (US6931723).

Re Claims 9-10 and 23-24, Marian, Kaczmarek, Rockwood and Tilton disclose According to claims 1 and 15 respectively,

Marian, Kaczmarek, Rockwood and Tilton do not disclose

the printed circuit board is flexible comprises a plurality of second layers, located one above the other,

Powell teaches a device wherein

the printed circuit board is flexible (flexible circuit [col. 4, line 51])
comprises a plurality of second layers (interior conductive layers 5, fig. 8 and fig. 11), located one above the other (fig. 11),

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the flexible circuit board with the plurality of interior conductive layers as taught by Powell in the electronic device of Marian, in order to seal the opening of the electronic device more tightly and be able to make more electrical connections for the electronic device.

Re Claims 11 and 25, Marian, Kaczmarek, Rockwood and Tilton disclose

According to claims 5 and 24 respectively, the first contact element and the second contact element are coupled via a conductor track (70, fig. 5),
Marian, Kaczmarek, Rockwood and Tilton do not disclose

the first contact element and the second contact element are coupled via a plurality of conductor tracks, which are located one above the other and electrically coupled;

Powell teaches a device wherein

the first contact element and the second contact element are coupled via a plurality of conductor tracks (interior conductive layers 5, fig. 8 and fig. 11), which are located one above the other and electrically coupled (fig. 5);

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the plurality of interior conductive

layers as taught by Powell in the electronic device of Marian, in order to be able to make more electrical connections for the electronic device.

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xiaoliang Chen whose telephone number is (571)272-9079. The examiner can normally be reached on 8:00-5:00 (EST), Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jinhee Lee can be reached on 571-272-1977. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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